USDA Natural Resources
Conservation Service

Ecological site DX034A02X104
Clayey Pinedale Plateau (Cy PP)

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to Rare. Some very minor rills (less than 12 in. or 30 cm) may occur after a major thunderstorm event or spring runoff. Rills may also occur in areas of greater slope (>8%) and adjacent to areas with exposed bedrock, but should heal during the following growing season

2. **Presence of water flow patterns:** Barely observable. Some minor evidence of water flow patterns may be found winding around perennial plant bases with little evidence of erosion and they are short; less than 6 ft (2 m) long, less than 1 ft (30 cm) wide, and disconnected.

3. **Number and height of erosional pedestals or terracettes:** None to Rare. Pedestals may occur on slopes greater than 8%. Roots are not exposed with blunted features and are not active.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is typically 15% - 30%. Bare ground is scattered throughout this site and patches are not connected. Higher bare ground is expected after a sagebrush killing event, but returns to less than 30% within 2 years post disturbance.

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Rare to nonexistent.

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move only in short distances (to leeward side of shrubs) due to wind. Large woody debris from sagebrush will show no movement.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 2 in the interspaces to 6 under plant canopy, but average values should be 4.0 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil organic matter (SOM) <2% is common. Color and structure are difficult indicators to assess in semiarid soils because SOM potential is naturally low. Typically, the soil surface consists of an A-horizon of 1-6 inches (3-16 cm) thick with strong medium granular structure and a subsurface that is medium to strong subangular blocky or prismatic structure. The surface is typically brown to grayish brown (i.e. 10YR 4/3 to 5/2) with a similar colored subsurface. Field indicators of departure from the reference condition include exposure of subsoil as evidenced by excessive pedestalling and/or surface disturbance.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community composition by dry weight consists of 45-60% grasses, 10% forbs, and 30-45% shrubs. Evenly distributed plant canopy (30-50% foliar cover), litter and moderately slow to very slow permeability result in slight runoff. The shrub component is important for snow trapping and the herbaceous component is important for reducing runoff from short intense thunderstorms. Basal cover is typically less than 5% for this site and does very little to effect runoff on this site.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None, but soil cracking and crusting in dry conditions is typical. Soil probe refusal may result in a mis-identification of a compaction layer, and must be described by hand dug holes.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: 1.1 sagebrush (1 species)
    1.2 rhizomatous grasses (2 species)

    Sub-dominant: 1.1 rhizomatous grasses (2 species)
    1.2 sagebrush (1 species)

    Other: Minor:

1.1 mid-size cool season bunchgrasses (2 species)
short, cool season bunchgrasses (1 species)
perennial forbs (2 species)
sprouting shrubs (1 species)
1.2 mid-size cool season bunchgrasses (2 species)
short, cool season bunchgrasses (2 species)
sprouting shrubs (1 species)
perennial forbs (2 species)
Trace:
annual forbs (2 species)

Additional: 12a. Relative dominance of functional/structural groups.
1.1 mid-size cool season bunchgrasses > short, cool season bunchgrasses > perennial forbs > sprouting shrubs >> annual forbs
1.2 mid-size cool season bunchgrasses > short, cool season bunchgrasses = sprouting shrubs > perennial forbs >> annual forbs
12b. Functional/Structural groups not expected:
annual grasses
12c. Number for functional/structural groups: 7
12d. Number of species in dominant/sub-dominant f/s groups: 3

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.

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14. **Average percent litter cover (%) and depth (in):** Litter ranges from 15-40% of total canopy measurement with total litter (including beneath the plant canopy) from 45-70% expected. Herbaceous litter depth typically ranges from 1-5mm. Woody litter can be up to 1-2.5 inches (4-6 cm) in diameter.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 400-800 lb/ac (600 lb/ac average); Metric 448-897 kg/ha (673 kg/ha average).
    1.1
    PERENNIAL MID-SIZE COOL SEASON GRASSES (5-10%)
    RHIZOMATOUS GRASSES (10-25%)
    MISC. GRASSES/GRASSLIKES (5-10%)
    PERENNIAL FORBS (5-9%)
    ANNUAL FORBS (0-1%)
    SAGEBRUSH (20-40%)
    MISC. SHRUBS (0-5%)

    1.2
    PERENNIAL MID-SIZE COOL SEASON GRASSES (5-15%)
    RHIZOMATOUS GRASSES (10-35%)
    MISC. GRASSES/GRASSLIKES (5-10%)
    PERENNIAL FORBS (5-9%)
    ANNUAL FORBS (0-1%)
    SAGEBRUSH (5-20%)
    MISC. SHRUBS (5-10%)

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Annual weeds such as halogeton, kochia, mustards such as desert alyssum and flixweed, lambsquarter, and Russian thistle are common species to invade disturbed sites. Cheatgrass (*Bromus tectorum*) and hoary alyssum (Berteroa incana) are emerging invasive species to this LRU, but have not been found on this site. Other noxious weeds that could potentially invade this site: Canada thistle (*Cirsium arvense*) and whitetop (*Cardaria draba*). Greasewood (Sarcobatus vermiculatous) is a native shrub that can encroach from adjacent salt affected sites.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years. Thickspike wheatgrass will commonly reproduce by underground rhizomes and not by seed production.
